

ISP203A Test #1 Spring 2010

Multiple choice and true false are 2 pts each.

1. When water vapor condenses

- a. water molecules become less dense
- b. water molecules are bonded to one another**
- c. the hydrogen and oxygen atoms combine to form H₂O gas
- d. the temperature of the water decreases

2. If 30×10^6 km of ice on earth melts, most of that water will eventually reside in which reservoir?

- a. oceans**
- b. atmosphere
- c. lakes and streams
- d. ground water

3. A single molecule of water weighs least

- a. in ice
- b in seawater
- c. in freshwater
- d. in water vapor
- e. it weighs the same in all of the above.**

4. I live in a house in Michigan only 1000 feet from a large river.

Fortunately, my house sits on hill 100 feet above the river so I don't worry about floods. I've decided to put in a well for water. How deep will my well have to be to reach the water table?

- 1. less than 100 feet deep**
- 2. more than 100 feet deep.
- 3. exactly 100 feet

5. The volume of water flowing out of the Great Lakes each year is approximately 200 cubic kilometers per year. The volume of water in the Great Lakes is approximately 6000 cubic kilometers. What is the residence time, in years, of water in the lakes?

- a. 10-20 years
- b. 25-35 years**
- c. 50-75 years
- d. greater than 75 years
- e. less than 10 years

6. When a teapot boils we see a white cloud rising from the spout.

Why does the cloud disappear?

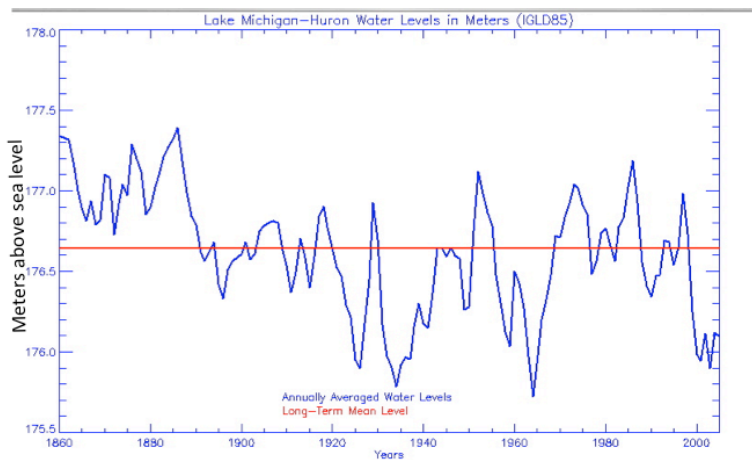
- a. water in the cloud condenses
- b. water in the cloud evaporates.**
- c. water in the cloud break a part to form H⁺ and OH⁻ ions.

7. A hot air balloon rises because

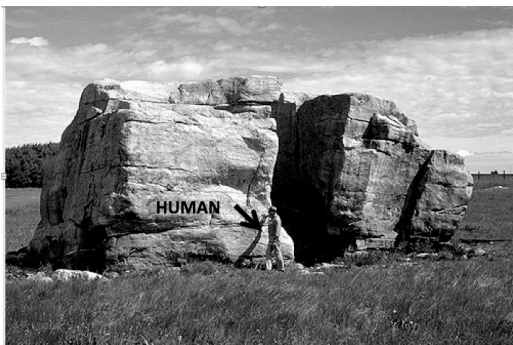
- a. hot air molecules are less dense than cold air molecules
- b. heat causes molecules in the air to break apart
- c. hot air is less dense than cold air.**
- d. heat evaporates the water in air

8. The diagram below shows water levels in the lakes Michigan and Huron. Some people think the diagram shows a general decline in water levels although others argue that the annual variations are so large that no trends can be documented. Assuming there is a change in the lake level, what is the most likely reason for the change.

- a. **Warmer temperatures are causing less ice cover of the lakes so there is more evaporation in winter.**
- b. Stream flow in the Great Lakes region is decreasing so less water is flowing from streams into the lakes
- c. With less ice on the Saint Lawrence River more water can flow to the oceans.
- d. More water is being shipped to the desert southwest to reduce the effects of drought in that region.



9. The picture below of a 20-foot high rock is evidence that:



- a. Glaciers once scoured away the surrounding rocks leaving this remnant.
- b. Winds during a prolonged drought removed the surrounding soil.
- c. **Glaciers carried huge rocks to this area**
- d. A huge river once flowed through this area.

10. If drought in southwestern US continues, one argument will center around the question of how much water should be used for agriculture versus how much should be allocated to people living in cities and suburbs. Some farmers will argue that they have a right to the same amount of water they have always used, or at least the same percentage. People in cities and suburbs will argue that the economy has shifted away from farming and that they should receive a share of the water that reflects both the increased population and the increased wealth generated by cities and suburbs.

Which of the *five categories of ethical approach* is a basis for the farmers' claim?

- a. Utilitarian
- b. Fairness of Justice
- c. Virtue
- d. Rights
- e. None of the above**

11. In the past, major droughts have been associated with global cooling, not global warming.

a.T b.F

12. We calculated the rise in sea level due to melting glaciers. In that calculation we needed to know that the density of ice is 0.9 g/cc and the density of liquid water is 1.0g/cc. If the density of ice were greater than the density of water, then the calculated rise in sea level would have been less.

a.T b.F

13. The amount of water vapor in the atmosphere will increase as our planet becomes warmer.

a.T b.F

14. When plants respire, the energy stored in biomass is released.

a.T b.F

15. Caffeine molecules contain more energy than sugar.

a. T b. F

1. The drawings below show a river in an area where there is abundant rainfall in Spring and Fall but very little precipitation in the summer. As a result, the river level in the summer is much lower than in the Spring and Fall. Complete the diagram below by drawing the water table as it would look during the summer. 10pts.

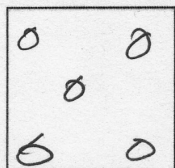


2. Complete the following sentences. Write the most meaningful comparisons you can. It is not very meaningful to stating that a cold is similar to an allergy because people can have both. It is meaningful to state that both cause an immune response. 15 pts

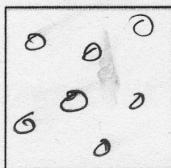
- a. A balloon floating in air is similar to *boat floating in water*
They are similar because *both are caused by the density of the object being less than the fluid*
- a. Sublimation is similar to evaporation because *both can be caused by the air having a low concentration of water vapor*
- c. Atmospheric circulation is similar to thermohaline circulation because *both are caused by dense fluids sinking*

3. Show the differences between solid, liquid and gaseous water by drawing water molecules in each of the three boxes below. Represent a water molecule by a single circle. You do not need to show the individual atoms that make up the molecules. 15 pts

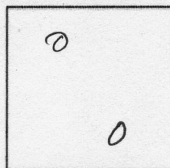
solid



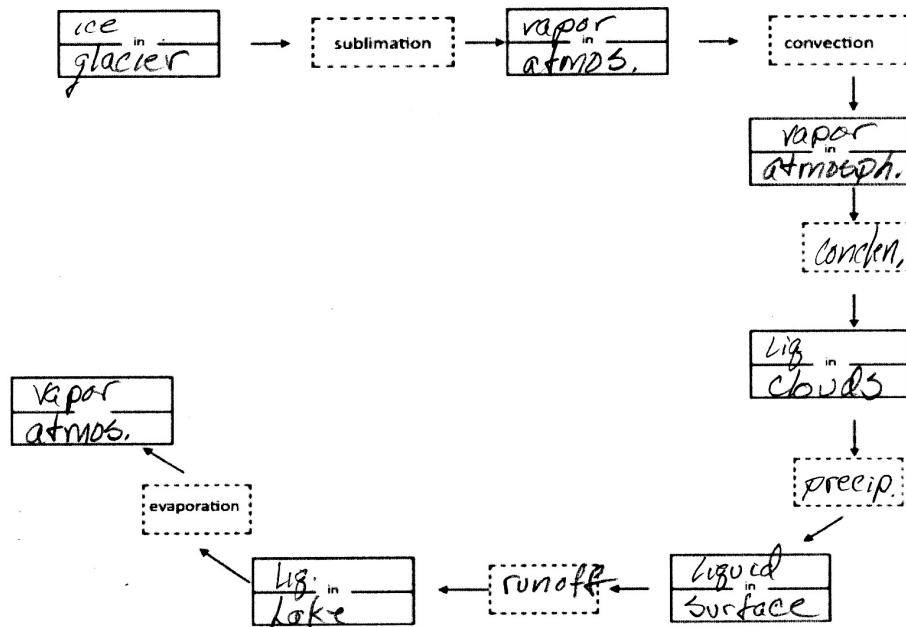
liquid



gas



4. Complete the box and arrow diagram below. Fill in the state of water; solid, liquid or gas and location of the water in the boxes with a solid outline. Put in the process that moves or changes water in the boxes with a dashed outline. 15 pts



5. Complete the box and arrow diagram below using the same reservoirs you entered in #4. Fill in the state of water; solid, liquid or gas and location of the water in the boxes with a solid outline. Put in the energy involve in moving or changing the water in the boxes with a dashed outline. 15 pts

